

# NASA TECH BRIEF

## Lewis Research Center



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### Dynamics of Short Pressure Probes

#### The problem:

In studies of stall propagation through an engine, several transient total pressure probes are located in the inlet and in between the engine compressor stages. The probes have internally mounted miniature pressure transducers connected to short total-head tubes. To protect the transducer from damage by entrained particles in the airstream, either the transducers are mounted at right angles to the axis of the probe, or offsets or baffles are included in the internal geometry of the probe. The problem involves incorporating the particle impact protection features and the average total pressure measurement into the probe design without degrading the transient response of the measuring system.

#### The solution:

An experimental program was conducted, and the report on that program presents practical design information for optimizing the transient response of the probes. A computer program calculates the probe response, based on the Bergh-Tijdeman equation.

#### How it's done:

The frequency response and the frequency response variations resulting from probe geometry variations were measured for probes 2.54 cm long with i.d.'s

of 0.325 and 0.160 cm. Geometrical variations were designed to permit simultaneous measurement of time-average pressure and to protect the pressure transducer from particles entrained in the airstream. For comparison, a computer program was used to calculate the frequency response of a multi-tube volume system, using the Iberall and Bergh-Tijdeman equations. Measured frequency response showed good correlation with predictions made by the computer program.

#### Notes:

1. This program is written in FORTRAN IV for use on the IBM-7094 computer.
2. Requests for further information should be directed to:

COSMIC  
112 Barrow Hall  
University of Georgia  
Athens, Georgia 30601  
Reference: B71-10374

#### Patent status:

No patent action is contemplated by NASA.

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